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High Charge States Heavy Metal Ion Source Based on Vacuum Spark

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Elevation of ion charge states in vacuum discharge plasma is interesting for ion beams physics, because for practical using it leads to proportional increasing of ion beam energy with the same accelerating voltage. The ion charge state elevation of metal ion beam could be provided in vacuum arc ion source by using vacuum spark, which is initial stage of vacuum arc. Since the voltage between anode and cathode remains high compare with the vacuum arc higher charge states of metal ions in discharge plasma were generated and than extracted in ion beam. The using a spark of pulse duration less 10 microseconds and with amplitude current up to 10 kA provides generation of ion beams with current of several amperes with pulse repetition rate up to 5 pps. The higher ion charge states for heavy ions (bismuth) were up to 15+ and mean ion charge state was more than 10+. Physics and techniques of vacuum arc spark ion source are discussed.

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